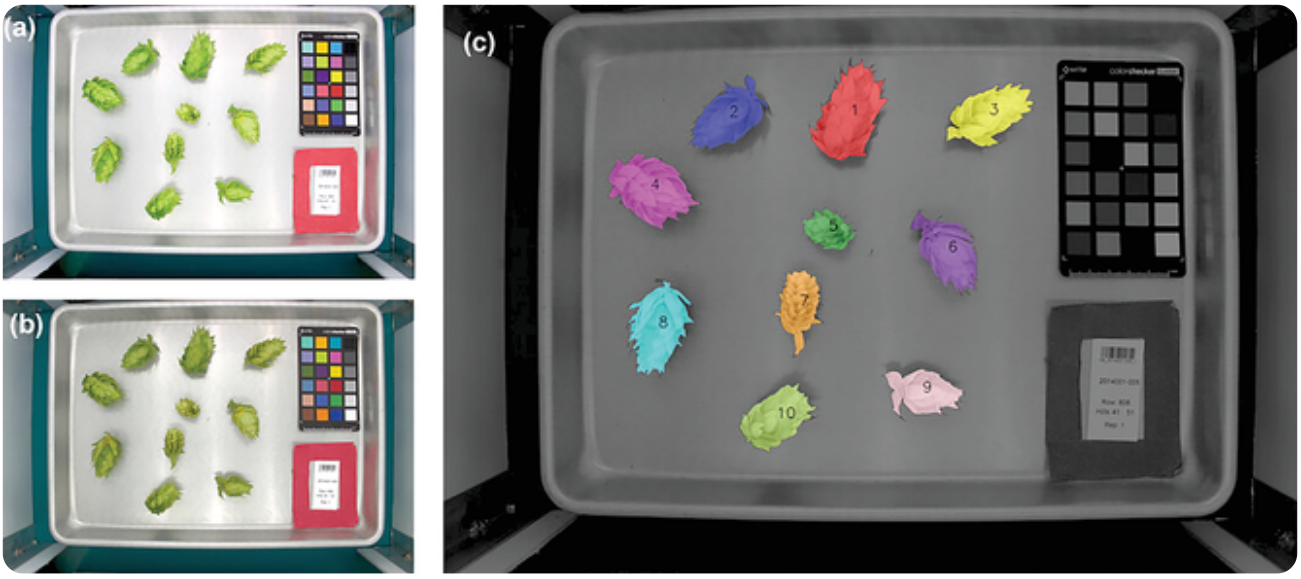
Science Societies

‘HopBox’ Streamlines Analysis of Hop Cone Morphology

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The HopBox image-processing pipeline. (A) is the original image, (B) is the color-corrected image, and (C) features the identification and labeling of each individual cone within the image.

Elements of hop cone morphology, such as size, openness, and weight, can influence picking and drying processes. Small cones can get discarded during picking, resulting

in yield loss, and large, dense cones may be inefficient to dry. However, these attributes are not typically evaluated in breeding and research programs due to the extensive variation within a genotype and the tedious nature of data collection.

Using a light box and a camera mount, a team of USDA‐ARS scientists created an imaging system dubbed “HopBox” that images up to 10 hop cones at a time. They developed an analysis pipeline that color‐corrects the images, reads a QR code, and exports data on hop cone length, width, area, perimeter, openness, weight, color, and density. The researchers analyzed 15 hop genotypes from the USDA‐ARS breeding program in Prosser, WA and found that imaging 5–10 cones per genotype adequately captured the existing variation, but sample sizes up to 30 resulted in optimal precision.

Instructions to create a HopBox and the associated image analysis pipeline are publicly available online (https://github.com/kraltendorf/HopBox). The HopBox expands data collection possibilities in breeding programs and enables new lines of inquiry into the role of hop cone morphology on picking and drying efficiency.

Adapted from Altendorf, K. R., Heineck, G. C., Wakholi, C., Tawril, A., Raja, P., & Rippner, D. (2023). HopBox: An image analysis pipeline to characterize hop cone morphology. *The Plant Phenome Journal*, *6*, e20080. https://doi.org/10.1002/ppj2.20080

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